## REMARKS

Claims 1-33 are pending in the present application. Claims 1 and 22 have been amended herein to clarify that the method for depositing the thin multicomponent oxide film comprises repeating a single deposition cycle. Claim 24 has been amended to incorporate Claim 25, which has been cancelled. No new matter is added by these amendments.

Claim Rejections Under 35 U.S.C. 103(a)

The Examiner has maintained the previous rejection of the claims as obvious over George et al. (J. Phys. Chem. 100:13121-13131 (1996)) in view of one or more additional references. The Examiner found that George teaches deposition of a variety of oxides by ALD and that various materials can be alternated to form superlattices. The Examiner concluded that this reads on multicomponent or tertiary oxide films.

George Does Not Teach or Suggest Multicomponent Oxide Films Comprising Silicon and a Metal

First, Applicants submit that George has no teaching or suggestion of a multicomponent oxide comprising silicon and another metal. To the contrary, George only discloses single, binary oxides. While George does refer to the possibility of making superlattices, this does not provide any teaching or suggestion of a superlattice comprising silicon oxide and another metal oxide, and certainly does not teach or suggest a multicomponent oxide comprising silicon and a metal.

In support of the rejection, the Examiner simply states that it would have been obvious to modify George et al by selecting $SiO_2$ and another metal oxide "because selection of a known material based on its suitability for its intended use is held to be obvious." Here, the preparation of a multicomponent oxide comprising silicon and a metal is not selection of a known material based on its suitability for an intended use. While George discloses examples of dielectric materials, the focus is on the mechanisms of ALD, not deposition of dielectric materials. In particular, there is no suggestion of making dielectric superlattices comprising multiple different dielectric layers, much less superlattices comprising silicon oxide and another metal oxide or multicomponent oxides comprising silicon and a metal.

The reference in George to superlattices is not made in any particular context and refers to the general advantages of ALD and the possibility of making multilayer structures by ALD. There is no suggestion in George of dielectric layers comprising more than one type of metal oxide, much less of multicomponent oxide films comprising silicon and a metal, and no secondary references have been cited that would make up for this deficiency. As a result, the situation is not one where the skilled artisan would simply substitute one known dielectric material for another and thus this is not the case of selecting known materials for use in a disclosed structure or method.

The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. In re Mills, 916 F.2d 680, 16 USPQ2d 1430 (Fed. Cir. 1990). Here, there is no teaching or suggestion of a multicomponent oxide film comprising silicon and a metal in George or any of the secondary references. Thus, the Examiner has not shown the necessary motivation to alter the teachings of George to arrive at the claimed combination and a prima facie case of obviousness has not been established.

In response to Applicants previous arguments, the Examiner found that "$SiO_2$ is well known in the art to be a commonly used dielectric; therefore it would have been obvious to a person of ordinary skill in the art to use silicon dioxide because it is used as a gate dielectric and is commonly used in the art." Applicants do not dispute that George discloses deposition of $SiO_2$ by ALD. However, this does not provide any suggestion for methods of depositing a multicomponent oxide comprising silicon and a metal. The Examiner also points to Silverstein (US 4,467,238) and Lehmann (US 5,759,903) for the proposition that $SiO_2$ and $TiO_2$ layers are known. Silverstein is concerned with forming IR reflective layers in sodium lamps. There is no teaching or suggestion in Silverstein to deposit the film by ALD, or that the film would benefit from deposition by ALD. Lehmann refers to multilayer dielectrics comprising $SiO_2$, $Si_3N_4$ and $SiO_2$. There is no suggestion of multicomponent oxides comprising Si and a metal, or even of multilayer dielectrics comprising silicon oxide and another metal oxide. Further, Lehmann has no suggestion that a highly conformal deposition process, such as ALD, would provide some advantage. The Examiner apparently recognizes the lack of relevant teachings in these references because they are not part of the actual §103 rejection.

George Does Not Teach or Suggest Multicomponent Oxide Films

Even if George did teach or suggest superlattices comprising alternating layers of two or more dielectric materials comprising silicon and a metal, this does not teach or suggest a multicomponent or tertiary oxide. A superlattice is a nanolaminate structure comprising defined, alternating layers, where each layer comprises a single material. In the context of George, the skilled artisan will appreciate that such structures would comprise two or more binary oxides, rather than a single multicomponent oxide. In contrast to superlattices and other nanolaminate structures, the recited multicomponent oxides do not comprise alternating layers of silicon oxide and metal oxide. Rather, they comprise a *single*, multicomponent oxide.

In ALD processes, less than a complete monolayer of a material is deposited in each cycle because of the steric hindrance of the reactants. For example, contacting a substrate with a vapor phase silicon compound will not produce a complete monolayer of silicon. As a result, when the metal precursor is provided, a mixed layer of metal and silicon is formed. Contacting the bonded silicon and metal compounds with oxygen thus produces a single material comprising metal, silicon and oxygen, not alternating layers of silicon oxide and metal oxide. The cycle is then repeated and the thickness of the material increases. However, a superlattice is never produced because there is only a single multicomponent material – there are no defined layers of silicon oxide and metal oxide.

Claims 1, 22 and 28 have been amended to clarify that a multicomponent oxide is deposited by repeating a deposition cycle that produces one material. This is not taught or suggested by deposition methods for producing superlattices or nanolaminates, which would require alternate repetition of two or more different deposition cycles in order to form a structure with multiple, defined layers of two or more materials.

There is no teaching or suggestion in George to deposit anything other than binary oxides. The fact that George discloses that superlattices can be formed does not change this basic fact; at best it simply suggests that different binary oxides can be deposited alternately. This does not in any way teach or suggest depositing a single material comprising silicon, a metal and oxygen.

In view of the lack of teaching or suggestion in George or any of the secondary references to form a multicomponent oxide comprising silicon and a metal, Applicants request withdrawal of the rejections under 35 U.S.C. §103.

Double Patenting

Claims 1-33 were provisionally rejected under the judicially created doctrine of obviousness-type double patenting over Claims 65-65 of co-pending U.S. Application No. 10/148,525, the parent of the present application. Applicants note that Claims 56-65 have been cancelled in the co-pending application. Thus, this rejection can be withdrawn.

Conclusion

In view of the arguments presented above, Applicants submit that the present application is in condition for allowance and respectfully request the same. If any issues remain the Examiner is cordially invited to contact Applicants' representative at the number provided below in order to resolve such issues promptly.

Respectfully submitted,

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